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Lifestyle education in diabetes risk group

A quantitative study in restricted context

Terho Hytönen
Heikki Väyrynen

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JYVÄSKYLÄN AMMATTIKORKEAKOULU
JAMK UNIVERSITY OF APPLIED SCIENCES

JYVÄSKYLÄN AMMATTIKORKEAKOULU
JAMK UNIVERSITY OF APPLIED SCIENCES

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Jaana Perttunen, Heli Rautiainen

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Abstract

Purpose of this study is to examine and observe people who are included in diabetes risk group and how lifestyle education affects them from a quantitative point of view.

The material was composed of Jyväskylä University of Applied Sciences, Health and social studies Unit students, of which for the research five people were selected, after pre-selection. For the pre-selection criteria we set age under 30 years and being part of the diabetes risk group. Participants in a study were measured in September and December 2014, in which they were instructed to arrive fasting. After the first measurements, the group was given lifestyle education, from purpose tailored material as a group, about exercise, nutrition and drug abuse.

The data was analyzed in Microsoft Excel 2000 software. The research data analysis looked at changes in the averages and percentile frequencies of the results. The data also determined the medians, the extreme values, quarter quartiles and standard deviations. Because of the small amount of participants, t-test was not concluded. According to this study given lifestyle education appears to be, in this limited context, an efficient way in relation to the measured physiological values. The given lifestyle counselling has been clearly the trigger that has put lifestyle changes in motion in our research group, with which the participants have been able to preventively lower their risk of getting diabetes. The most significant changes observed in the group were lowering of the systolic blood pressure, fasting blood glucose and the body weight. In the future, it would be important to examine how individual perspectives can be integrated into a comprehensive, group carried out, lifestyle counseling, or to other similar intervention activities.

Keywords

Diabetes, lifestyle counseling, young adults, blood glucose

Michelaneous

Thesis data sheet as an appendix from page 44 to 47.

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Tiivistelmä

Tämän opinnäytetyön tarkoituksena on tarkastella ja havainnoida diabetesriskiryhmään kuuluvien tutkimushenkilöiden elämäntapaohjausta kvantitatiivisesta näkökulmasta.

Opinnäytetyön aineisto koostuu Jyväskylän ammattikorkeakoulun Hyvinvointiyksikön opiskelijoista, joista tutkimukseen valikoitui ennakkovalinnan jälkeen viisi henkilöä. Ennakkovalinnan kriteeristöön asetimme alle 30 vuoden iän ja diabetesriskiryhmään kuulumisen. Osallistujille suoritettiin tutkimusmittaukset syyskuussa ja joulukuussa 2014, joihin heitä ohjeistettiin saapumaan ravinnotta. Ensimmäisten mittausten jälkeen joukolle annettiin elämäntapaohjausta, räätälöidyistä materiaaleista, ryhmätilanteena aihealueiden ollessa ravitsemus, liikunta ja päihteet.

Aineistot analysoitiin Microsoft Excel 2000 -ohjelmistolla. Tutkimusaineiston analyysissä tuloksia tarkasteltiin keskiarvojen muutosten ja persentiilifrekvenssien kautta. Aineistosta määritettiin myös mediaanit, ääriarvot, neljänneskvartiillit ja keskihajonnat. Aineiston pienuuden vuoksi t-testiä ei tehty. Tämän tutkimuksen mukaan ryhmätoteutuksena tarjottu elämäntapaohjaus näyttäytyy, tässä rajatussa kontekstissa, tehokkaana tapana suhteessa mitattuihin fysiologisiin arvoihin. Elämäntapaohjauksen merkitys opinnäytetyömme tutkimushenkilöiden keskuudessa on selkeästi ollut liikkeelle laittava tekijä, jonka avulla tutkimukseen osallistuneet henkilöt ovat saaneet ennaltaehkäisevästi pienennettyä diabetesriskiään. Tutkimushenkilöryhmässä merkittävimmät muutokset näyttäytyivät systolisen verenpaineen, paastoverensokerin ja kehon painon laskemisena. Jatkossa olisi tärkeää tutkia, kuinka yksilöllistä näkökulmaa voidaan integroida kokonaisvaltaiseen, ryhmässä toteutettuun, elämäntapaohjaukseen tai muuhun vastaavaan interventiotoimintaan.

Avainsanat (asiasanat)
Diabetes, elämäntapaohjaus, nuoret aikuiset, verensokeri

Muut tiedot
Liitteenä opinnäytetyön raakadata, sivut 44-47.

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1 Used abbreviations

Table 1. Used abbreviations

Unit	Definition
bpm	Unit of measurement for heart rate. Abbreviation of beats per minute.
Degree	Degree is unit of an angle, that is 1/360 of a full turn. (Kangasaho, Mäkinen, Oikkonen, Paasonen & Salmela 2000, 7.)
Joule	Is a measurement unit of energy or work. (Kervinen, Parkkila & Konttinen 2013, 66.)
Kcal	Is an unit of energy. 1 kcal is the amount of energy that is needed to raise the temperature of 1 kg of water by 1 degree celsius. (Göbel, Mills & Wallard 2006, 145.)
Kilogram	Kilogram is the base unit of mass for the International System of Units. Kilograms mass is the same as the mass of the International prototype of kilogram. (Kervinen, Parkkila & Konttinen 2013, 64.)
Liter	Is a measurement of volume that equals to 1 dm^3. (Kervinen, Parkkila & Konttinen 2013, 67.)
Metre	Metre is the base unit of length in the International System of Units. It is the length that light travels in a vacuum in 1/299 792 458 seconds. (Kervinen, Parkkila & Konttinen 2013, 64.)
mmHg	Is an unit of pressure that is used widely in medicine. It is the pressure that is exerted by 1 mm high column of mercury, approximately 133,322 Pa. (Göbel, Mills & Wallard 2006, 127.)
Mole	Is an unit that describes the amount of some chemical substance. This can contain many different elemental entities. (Kervinen, Parkkila & Konttinen 2013, 65.)
Second	Is the base unit of time in the International System of Units. (Göbel, Mills & Wallard 2006, 112.)

2 Introduction

Patient education is today one of the most important tasks of the nursing personnel. During our Nursing degree we have been taught how to educate patients concerning health related subjects, and we have been taught to look at this education process comprehensively from different points of views. We wanted to implement a real life education situation and give the research subjects responsibility on how they will use and adapt the given health information into their daily life.

The Finnish health ministry has released new nutrition guidelines in the early 2014 which gives the scientific study based guidelines for balanced nutrition. These guidelines are made to help Finnish people become healthier through nutrition, by addressing the current pressing concerns of the public health. The average Finnish person should have diverse diet, consisting from fruits, vegetables, fish, low fat meat, poultry, dairy products and whole grain products, while avoiding red meat, alcohol, sodium and products that have added sugar. The fats that are ingested should mainly be healthy fish oils and unsaturated fats with slow and weak glycemic index. (Fogelholm, Hakala, Kara, Kiuru, Kurppa, Kuusipalo, Laitinen, Marniemi, Misikangas, Roos, Sarlio-Lähteenkorva, Schwab & Virtanen 2014, 11.)

Lifestyle education mainly consists nutrition, exercise and substance abuse counselling. Domestic prevention of diabetes, the Finnish Diabetes Association is an important factor. The most important lifestyle counseling and health study has been the research and a follow-up of the The Finnish Diabetes Prevention Study DPS 2001, in which the effectiveness of the health guidance has been monitored for several years.

Our thesis purpose is to give some kind of a quantitative view about lifestyle education in diabetes risk group. Our sample group is often sedentary, has unhealthy lifestyles and obesity. On the other hand, they also have the conditions to change their lifestyle for the better. (Kunttu & Pesonen 2012, 48.) We want to bring our theoretical knowledge to practice by giving promotive life-

style education for people who can actually get benefit about it. Within this thesis we also create our own education material for the examinees which can be used in another research.

3 Knowledge base

Our study's knowledge base is rooted on scientific research and in the Finnish current care guidelines at the time of this research. We have also used the international scientific community's widely accepted studies and treatment recommendations that bring reliable information on the topic. In information searching, we have obtained from using the Medic- and Nelli databases. In Medici the main search phrases were Metabolic Syndrome X / or Diabetes, Lifestyle and Diabetes, Nutrition and Diabetes. The general thesaurus keywords were, Lifestyle and Diabetes, Diabetes Eating Habits + Diabetes, that we used the Nelli portal. As a third important source material databases we have had Duodecim Current care guidelines database, as well as Duodecim Opinportti.

3.1 Defination of diabetes risk group

Diabetes is the body's metabolic disease that occurs in particular, in the action of insulin or in the disturbance of secreting insulin in relation to a person's glycemic control. Generally the diseases are divided into two subgroups, type 1 and 2, the first of which is congenital and the latter resulting in adulthood. In type 1 diabetes, glucose metabolism disorder is caused by autoimmune destruction of the pancreatic ß-cell as a result of inflammation, which is why insulin secretion decreases, and with time runs out. Type 2 is mostly on the emergence of insulin resistance in the body, known as the weakening of the power to transfer amount of sugar in the tissue, which now needs more insulin than in the past. Risk factors for type two diabetes include being overweight, lack of exercise, high blood pressure and epidemiological family history. (Ebling 2010, 234-236.) According to Ebling (2010, 237) the best way to prevent type 2 diabetes is lifestyle education.

Type two diabetes in at-risk individuals is often diagnosed with the metabolic syndrome, which refers to a variety of pathophysiological accumulation of risk factors. In this case, minor changes can be observed in insulin and lipid metabolism of the individual. (Virkamäki & Niskanen 2009, 720.) The World

Health Organization defines elevated fasting blood glucose as a diagnostic sign of diabetes and metabolic syndrome, if it sets to the reference values from 6.1 to 6.9 mmol/l (World Health Organization 2006).

Abdominal obesity also has important role in metabolic syndrome, which can be easily measured with waist circumference. Virkamäki & Niskanen (2009, 722) talk about how the accumulation of fat around the pancreas and the liver exposes one to disturbances of glucose metabolism, because these internal organs are not specialized for the storage of triglycerides. Ectopic fat limit the risk in clinical practice guidelines (2013b) is defined as 100 cm in men and 90 cm for women.

Fat accumulation and obesity can be examined with body mass index, as it tells the patient's overall health status and lifestyle in general. BMI can mirror the structure of the person’s body and essence of the person, as well as through data collected on medical history and interview. But might not give a clear picture of the health. For example, a robustness and a very muscular person's body mass index do not necessarily give the right information about his situation. The body mass index is calculated by dividing a person's weight (kg) by height (m) square, the length being taken into account for weight. Normal body mass index reference values are 18.5 to 25 kg/m^2. (Käypä Hoito 2013b.)

Blood pressure is also an important diagnostic tool for diabetes prevention. High blood pressure is a strain on the blood vessels, making them harden and the elastic nature of them suffering. In the long term, high blood pressure impairs renal function, in which case the whole metabolism is reduced and the fasting blood sugar value (fP-Gluc) rises contributing to insulin resistance. Blood pressure is defined as the Finnish treatment recommendation to 140/80 mmHg being regarded unhealthy, although the aim is generally considered to be 120/80 mm Hg. (Käypä Hoito 2013a.)

Finnish Diabetes Association has published diabetes risk group form, which makes it possible to identify a patient's risk of disease. The form is scoring 0-25 points, and in a seven-point result should the subject consider a lifestyle

intervention to take place. Such persons are at high risk for diabetes. (Suomen Diabetesliitto ry 2010.) Identifying high-risk individuals for observation is an essential part for the acquisition of the right survey samples. The most significant factors from the identification point of view, are elevated body mass index, oversized waist circumference, elevated blood pressure, elevated fasting plasma glucose value, as well as an unhealthy diet. (Terveyden ja hyvinvoinnin laitos 2011, 25–26.)

3.2 Lifestyle education in general

The intervention is an effective method of Preventive health promotion. Diabetes prevention and treatment development program 2000-2010 published by Suomen Diabetesliitto ry (2004, 20), The Finnish Diabetes Prevention Study (2001, 3230), the study found lifestyle counseling as an effective method in prevention work. The starting point of the intervention needs to be mapped to the selected target group or person, the knowledge base given needs to be in compact form, so it may be easily utilized in practice. (Lindström, Louheranta, Mannelin, Rastas, Salminen, Eriksson, Uusitupa & Tuomilehto 2001, 3230-3235.) In education situation, the knowledge needs to be in easily understood form. The group is given information about nutrition, physical activity and substance abuse behavior and then explained the diabetes risk reduction and expected changes in the health status to the person.

The study of persons at risk of diabetes was reduced by about 58 % when they were in enhanced nutrition and physical activity counseling scheme. On the guidance- information does not need to be individual, on the general material, the results are also comprehensive. (Lindström etc. 2001, 3230-3235.) Lindström and others (2001, 3232) argue that the implemented lifestyle changes have been small after the counseling. Significant factors they considered were several variables influence, of which the most important factor is dropping weight of the person being examined. This claim is also supported by the Finnish Diabetes Association's publication, the Diabetes Prevention and Care Development Program 2000-2010 (2004, 25), according to which

Colditz, Willett, Rotnitzky and Manson (1995) have shown an increased risk of diabetes logarithmically in relation to body mass index.

3.2.1 Nutrition

Nutrition is the basis for any life. The amount of basic energy need of a person is called basal metabolic rate, which is the the lowest amount of energy that is needed to sustain basic life supporting functions of the body in resting state. These basic functions include breathing, circulation, bowel functions, heating, etc. The body can still sustain itself with less energy but this results in the shutting down of some functions in the body and possibly even destruction of tissue. The basal metabolic rate of average male aged 18-30 years and weighing 76 kg is 7,7 MJ/d (1850 kcal/d). To the basal metabolic rate is then added the need of energy that comes from moving and working, this can range from 3,1 MJ (740 kcal) to 6,1 MJ (1457 kcal), or even more depending on the physical activity of the person in question. (Haglund, Huupponen, Ventola & Hakala-Lahtinen 2007, 10–13.)

Carbohydrates have always been the basis for any diet. Carbohydrates recommended daily intake is 45-60 % of the daily intake. (Fogelholm etc. 2014, 25.) The main function of these energy nutrients is to provide the cells with energy source and maintain the glucose balance of the circulation. Carbohydrates are also needed in the fat metabolism. Glucose is needed is needed as a source of energy for the brain, nervous system and muscles. (Haglund etc. 2007, 26–29.)

Fats are the most energy-dense nutrients, for this reason average person should avoid eating fat rich diets, as this can easily lead to accumulation of subcutaneous fat as it is likely that energy is left unspent. The amount that is recommended for fat intake by the Finnish nutrition recommendations is 32-33% of the daily energy intake. (Fogelholm etc. 2014, 25.) Some fats are still required for the body to function normally. Fats, which contain mainly of glycerol esterified with saturated and trans-fatty acids, are referred to as hard fats. Consuming too much of hard fats predisposes the body to multiple diseases, such as type 2 diabetes, cardiovascular diseases, cancer and gallstones.

(Haglund etc. 2007, 33-42.) Animal based saturated fats increases harmful LDL cholesterol, should people prefer unsaturated vegetable fats, such as olive oil, in their daily basis.

Proteins are basic building blocks of the body. Proteins can consist of about 20 different amino acids, the order and ways these acids are connected determine the structure and use of these proteins. They can be used to repair damaged tissue as well as build extra muscle if it is needed or even as secondary energy source if the body is suffering from deficit of energy. The human body cannot produce the necessary amino acids that are needed for this rebuilding. According to the Finnish nutrition recommendations the amount of proteins for average persons should be 10-20% of the daily energy intake. (Fogelholm etc. 2014, 25.) If the human body is severely malnourished it can also procure energy from its own muscles by breaking them down into proteins, this is called catabolism. (Haglund etc. 2007, 43–48.)

Fogelholm and others (2014, 11) dictate the guidelines for Finnish nutrition. These guidelines are made to help Finnish people become healthier through nutrition, by addressing the current pressing concerns of the public health. Finnish food is healthy and it has low glycemic index so it will not raise insulin level quick up and that is the reason why people who follow the finnish nutrition guidelines has more stable glucose - insulin metabolism. (Steingrimsdóttir, Karlström, Björck, Flint, Kolset, Uusitupa, Schulze & Jenkins 2005, 44-45.) The average Finnish person should have diverse diet, consisting from fruits, vegetables, fish, low fat meat, poultry, dairy products and whole grain products, while avoiding red meat, alcohol, sodium and products that have added sugar. The fats that are ingested should mainly be healthy fish oils and unsaturated fats with slow and weak glycemic index. (Fogelholm etc. 2014, 11.)

3.2.2 Substance abuse

Substance abuses counseling for diabetes risk group in terms of important factors include smoking, alcohol consumption and its reduction to fair amounts. These factors increase the risk of getting sick, so the substantial benefits to the ending the use or reducing it, will come across with comprehensive health status improvements. (Suomen Diabetesliitto ry 2014.) Alcohol consumption habits affect the risk group mainly because of its energy content, for the energy content of one dose of alcohol is about twice the amount of energy when comparing to carbohydrates. One gram of carbohydrate produces about 17 kilojoules of energy by burning, one gram of alcohol burns for about 30 kilojoules. (Alko 2013.)

Smoking's secondary disadvantage is often reflected in a few kilograms of weight gain, often due to an increase in appetite as a result of an increase in energy intake, when one stops smoking. However, the disadvantage of the risk factors is small compared to this. The effects of smoking to the development of diabetes are multidimensional. Nicotine constricts blood vessels, so blood pressure goes up. In this case, the inner surfaces of blood vessels can be damaged by the accumulation of cholesterol and formed plaque. Smoking also increases platelet aggregation and the venous capillaries have increased risk of blockage. Increase in blood pressure and increase in the risk of blockage are especially harmful to the kidneys and nervous tissues blood circulation, so metabolism is reduced and the target tissues have increasing risk of damage. Smoking substitutions are available to prevent symptoms of withdrawal. Studies show that the people who are using these products have slight increase in success rates. (Ilanne-Parikka 2011.)

Reduction in smoking and use of other intoxicating substances is a separate theme in our control situation. The application of theoretical knowledge in the control situation should be natural, and our aim is to provide our research subjects some ways to reduce substance abuse. Reducing alcohol consumption during the study period supports the nutritional change and smoking cessation, the increase in activity will increase the subject's oxygen uptake and respiratory function. (Ilanne-Parikka 2011.)

3.2.3 Exercise

Exercise is one of the basis for healthy way of life. Exercising is also one of the preferred lifestyle changes in prevention and treatment of type 2 diabetes. According to the Käypä Hoito guidelines (2012), the average 18-64 year old should do light aerobic exercise 2,5 hours per week, such as brisk walking or light gym, or 1,25 hours of heavy exercise. These exercise amounts can be divided into smaller sections to be done through the week. In their paper, Physiological effects of exercise, Burton, Stokes and Hall (2004, 185-188) explain the physiological effects of exercise. As a person is exercising, their energy consumption rises as their muscles expends ATP, or energy, also their pulmonary functions are intensified for trying to keep up with the increased oxygen consumption of the muscles. This varies depending on the person as conditioning of a person also varies.

Exercising should be individual for everyone, as the physical preparedness depends on the person and their background. Exercise in general strengthens the muscles, bones and joints. For the exercise to be more optimal should the individual also include strength training to build muscle and strength, by doing so the energy consumption of the body can be increased which can help when trying to lose weight. Exercising can also have numerous other benefits, such as improving mood, treatment of depression and boosting energy. (Käypä Hoito 2012.)

4 Purpose of the research

Purpose of this study is to observe the lifestyle education as a phenomenon using quantitative methods. We want to bring the theoretical knowledge in practice by offering promotional lifestyle guidance for research participants, who will benefit from it. During the research process, we create our our own education material using creditable material as a basis. Material we have created can also be used in other studies. Our research question is: How lifestyle

education appears as a phenomenon in trial subjects and their physical state by reviewing it with quantitative methods?

4.1 Goals

In our thesis we try to observe the changes in the body with measured numerical values. Our thesis research sample is small, so we can not do the generalized conclusion. Despite this, however, we can draw conclusions on a limited context and present the changes and phenomenons in the research subjects that we have observed. A secondary objective of our study is to motivate subjects to continue a healthy lifestyle after the investigation period. This secondary objective also can provides direct benefit to the individual, if it is fulfilled.

4.2 Hypothesis

The hypothesis of our study is that the measured values should change to a healthier way. If the subjects implement the general guidelines outlined in the education, every subjects body weight should drop, systolic blood pressure should be lower and fasting blood sugar should be less.

5 Implementation

In our thesis the research approach to the problem is quantitative, so we used as indicators the subjects' physiological measurement values. Measured values consisted of person's blood pressure, fasting blood sugar, waist circumference, body mass index, the Finnish Diabetes Associations diabetes risk test, Audit alcohol risk test and Fagerstöms two questions nicotine addiction test which are used by healthcare professionals. All persons belong to a predefined diabetes risk group and they were under 30 years old so the measurements had informative content and they are in relation to risk of developing significant disease. The risk group was defined with finnish diabetes risk test. Score of one point was the lowest result which person can get to be as an ex-

aminee. The measurements were performed in two stages, before and after the observation period. With this diaries, it was possible to control the implementation of lifestyle counseling. Length of the observation period was eight weeks.

5.1 The target group and education material

Education material can be found or given in many different forms. The most usual form for guidance material is written material, but it can have different forms such as audio, video or illustrative material. All material we used in preventive health education had to be objective, from a reliable source and be based on research. According to Parkkunen, Vertio and Koskinen-Ollonqvist (2001, 3-11) using such material in health education can have numerous benefits as it can improve the responsiveness and learning in the targeted group. This can be achieved by using educative material as it can help to visualize the educated subject much better than just verbal teaching, if the material is given to the person it can also work as a reminder and revision material. Education material is most usually made by national health organizations, medical companies or patient organizations. The given material should be creditable so that a person can trust the given information, having proper markings of references can help with credibility.

For our lifestyle education we chose to use the Jyväskylä area cooperation health centers guidelines as a base for our health education choices. These guidelines divide the life change into four steps, early premeditative stage, premeditative stage, planning and acting stage and maintaining stage. These stages promote the encouragement that a healthcare worker needs to help with. The guidelines also emphasize the importance of small steps in lifestyle changes, whether the changes are made in diet, exercise or use of substances, such as tobacco or alcohol. This means that using small changes it is much more manageable for the person to make lifestyle changes, as if a person tries to make several large changes in their habits and diet, they might be able to sustain the changed way of living for some time but will most likely

burn out and revert back to the old habits and diet. (Jyväskylän yhteistoiminta-alueen terveyskeskus 2011, 2-10.)

We chose to combine the early premeditative stage and premeditative stage in our work, because the target group that was chosen had to be people who are interested in weight loss and lifestyle changes. Because of this we saw that it was not as important to use all of the stages that were stated in the material. In our lifestyle education we used the premeditative stage, planning and acting phase and in the end of our research we give also the information needed in the maintaining phase, hoping that the subjects know where to get help from now on when we have finished with them. As opposed to if the person makes smaller changes that are more manageable, they might have higher chance in changing their lifestyle, as using smaller changes is much less demanding mentally than making large changes.

5.1.1 Early premeditative stage

In the early premeditatice phase the healthcare worker expresses their worries about the patients health, trying to get them to start considering the possibility of lifestyle change. The healthcare worker needs to listen the patients worries and try to motivate them in making the change in lifestyle. If the patient has tried to do a lifestyle change prior to this, it should be debriefed and notes should be taken on what had gone right and wrong, these can be used to tailor the incoming education to suit the needs of the patient. If the patient is openminded and receiving, some information can be given or some education material can be given. The main goal of this phase is to try and spark the interest and motivation in the patient. We decided to leave most of this phase out in our education, as the research subjects were already interested in making the lifestyle changes. Still we considered that some of this stages points should be used, and we incorporated them in our educations early e-mails and the premeditative stage. (Jyväskylän yhteistoiminta-alueen terveyskeskus 2011, 2.)

5.1.2 Premeditative stage

The goal of this phase is to help the patient make the decision on the lifestyle change. It is important to discuss the pros and cons of the current lifestyle choices that they are living with, these can be diet, exercise etc. You can discuss the challenges that the incoming lifestyle change can have and also how to solve some of these problems. In our education we incorporated this phase to our first education meeting. Here we discussed with the group about the benefits of certain lifestyle changes can have and how to achieve them. We decided that we want the subjects to use their own critical thinking in deciding what changes would serve them best. (Jyväskylän yhteistoiminta-alueen terveyskeskus 2011, 3-4.)

5.1.3 Planning and acting stage

This phase is best characterised by its name. The healthcare professional should try to find with the patient the best ways to make positive changes in the patients life. In this phase the patient should also make the final decision on acting with the plan. The next meeting should be sceduled to help and hear how the patient is doing. Again the patient should be motivated onward with their lifestyle change and the information should be proportioned with the patients motivation and ability to receive information. In our lifestyle education this stage was prepared with the given education and it was made up to the research subject to make the final decision on how and what to change, we gave the support and knowledge to do so. (Jyväskylän yhteistoiminta-alueen terveyskeskus 2011, 6-9.)

5.1.4 Maintaining stage

In this phase the patient is encouraged to continue with the achieved lifestyle changes. As they might need assistance and support to maintain the gained changes. It can be helpful to remind the patient about the starting situation and to remember the final goal that is permanent lifestyle change. A supporting network should be made out of healthcare workers, close friends and fami-

ly, who can help the patient to maintain the changes that have occurred. This phase was incorporated with our final meeting with the target group. We asked them to report any problems that have occurred and tried our best to help them. In the end we told the group that they can contact us if there is any problems or if they should need support with something. We also reminded the group that they should strive for their own goals and remember to not revert back to the old lifestyle choices that were worse than the new ones. (Jyväskylän yhteistoiminta-alueen terveyskeskus 2011, 10.)

5.2 Group intervention situations

According to Käypä hoito (2013b) guidelines for adult obesity state that adult obesity is a considerable contributor in other diseases, such as type 2 diabetes and hypertension. The main ways to give care to obesity are giving the patient information about the condition, the risks involved, giving lifestyle education about nutrition, attitude, exercise and giving the patient support that they need. Obesity counselling should be given in groups as this has as good results as individual counselling, and has proven to be much cheaper to provide.

Group counselling can also help the patients in different ways. The group can offer peer support for one another, share feelings, tips and encourage one another during harder times. As obesity can be a sensitive subject, it is best that the intervention situation could be arranged in friendly and accepting atmosphere, as a bad situation in the counselling can lead to the counselling having no response in the patient. This can be achieved by carefully planning the counselling situation to have people who are likeminded and are not likely to bring negative atmosphere to the counselling situation. (Jokelainen 2014.)

The counselling should be divided into several smaller intervention meetings to help patients and encourage them over a longer period, as this can also help with making the changes last and change to habits. Some motivated patients can manage lifestyle changes with just small number of meetings, but with more difficult cases the patients should be met every two to four weeks to

ensure that the patient gets the support and motivation that is needed. The needs of every patient can vary. (Käypä Hoito 2013b.)

For our counselling session we chose pick out several subjects from the students at Jyväskylä University of applied sciences. The subjects were all volunteers, which made it easier for us to as they were already motivated to some extent about losing weight. So we decided to focus more on the informative aspect of lifestyle education, but still without forgetting the importance of motivation. This gave us some idea about how to structure our own lifestyle counselling situation and what we would need to emphasize.

This counselling situation also needed to meet the same demands, which are required from normal nursing staff's lifestyle education interventions. It was decided that the research subjects would meet us as equals, so as not to provoke any feelings of being pressured. We focused on giving the information needed about the important subjects in weight loss, that were nutrition, exercise and use of intoxicants. With these we covered the most needed information. We also gave the subjects the option of contacting us at any time, if they felt that more support or information would be needed. The meetings were in September and in December. Extra support would be given if needed in between. The meetings were also combined with the measuring situation to give us and the research subjects more data about their current situation and at the end of the project information about their own current situation.

5.3 Measurements

Our study's most important part was the quantitative information gathered from our research participants, for which we used both direct and indirect methods of measurement. The reliability of measurements. The reliability and uniformity of our results was ensured by using reliable and previous research data about measuring physiological values. All the direct measurements were carried out using a calibrated measuring apparatus and to improve the accuracy, each measurement was performed three times, which were averaged to get the final result. If the measurement result was significantly abnormal, the

result was rejected and the required number of new measurements was taken. Subjects were instructed to prepare for the measurements by being deprived of food or drink for at least eight hours before the measurements. We also asked them to avoid alcohol for seven days. Preparations was controlled orally and a negative answer was an obstacle to the use of the measurement results. All subjects responded positively.

5.3.1 Blood pressure and resting heart rate

Blood pressure measurement was carried out as described above. The measurements used to automatic Omron M3 digital sphygmomanometer and appropriate manchette size according to the patients arm size. The measurement was started by selecting the position, seated position proved to be most comfortable for the patient, the relaxed arm of the patient was supported at a 90-degree angle. Appropriately sized cuff was placed around the upper arm firmly at the center of the elbow joint midline and the lower edge of two to three centimeters above the elbow. Before the measurement of trial subjects were told to relax for two minutes. He was instructed not to talk the entire time when we were taking the series of measurements. Between the measurements took place a two-minute break. (Muhonen 2012, 55-56.)

Blood pressure was divided into three sub-components, systolic and diastolic pressure, and mean arterial pressure. Systolic blood pressure, we used a quantity marking P_{sys},, diastolic pressure P_{dias} marking and labeling mean arterial pressure P_{map}. Unit in the blood pressure was millimeters of mercury, mmHg. At the same time as the blood pressure was measured, the resting heart rate that was provided by the sphygmomanometer, was also recorded. This heart rate was also confirmed by palpating the arterialis radialis from the same arm.

5.3.2 Fasting blood sugar

For measuring the blood glucose we used calibration free, Bayer Contour-blood glucose meter and also the same test strips included with the device. To verify the reliability of result, the measurement was carried out a series of three measurements and it was carried out of the left hand's ring finger or middle finger, unless there was a specific objecting factor. Before each measurement, the person's fingertip research was purified by denatured A12t- alcoholic fluid which was given the time to dry out and sterilise the puncture site. The manufacturer's instructions were followed for the measurement technique. According to manufacturers instructions manual, the lancet point is used to puncture the fingertip and thereafter, the first drop of blood will be wiped out. (Bayer HealthCare 2008.) The sample is taken from the second drop of blood. The label for this measurement was *fP-Gluc*, and the unit was *mmol/l*.

5.3.3 Mass

Measurement of the mass of the patient carried out in private, with a commercial scale, which measurement scale was 0,1 kg. The purpose of body mass measurement was to keep track of the changes in body weight and body mass index of the participants. Before the measurement, subjects were asked to go to the toilet, so that the excess secretion mass would not be registered. Individuals were weighed without shoes and shirts and as a reduction for clothing we used value of 1.0 kg, which was reduced at the measurement situation. The label that was given to mass was M, and the unit was kg.

5.3.4 Body Mass Index

The height of the participants was measured and calculated with the body mass, a mathematical body mass index was calculated for every participant. Body mass index reflects the person's height and weight ratio, making it possible to reliably categorize person BMI category. Height was measured only at an early stage. BMI factors affecting the reliability of body mass may become inaccurate, which is affected by a person's excess liquid cargo. The person

higher than normal muscle mass affect body mass index upward, this is, however, easy to see from the structure of the body by examining. The label for height was H, where the unit is m. BMI, we used a quantity indication BMI, which is a unit of kg/m^2. Body mass index was determined by using the formula for calculating *BMI : H*^{2}. (Fogelholm 2006, 49-61.)

Table 2. Body Mass Index categories

BMI: kg/m^2	**Category**
25–30	Overweight
30–35	Moderately obese
35–40	Severely obese
Yli 40	Very severely obese

(Fogelholm 2006, 49-61.)

5.3.5 Waist circumference

To detect abdominal obesity waist circumference was also measured, so that any internal abdominal fat should be detected. Waist Obesity is the most harmful type of obesity, since its effects on the metabolism and other metabolic disorders are significantly higher than the subcutaneous fat layer. The upper limit is defined as waist circumference of 90 cm for women and men 100 cm. (Käypä Hoito 2013b.) Waist circumference, we used a quantity marking C, and the unit was cm.

5.3.6 Diabetes risk test

The role of Diabetes risk test in our research was important because it defined the research subjects at the early stages of our research, who were include diabetes risk group. At the first stage we delimited score to one point, as already it gives according to the test a slight risk of diabetes. On the other hand test was meaningful to observe the trial subjects lifestyles comprehensively and reliably in a consistent meter, which deals with nutrition, exercise, drugs

and family disease history and age. The test is based on scientific knowledge, and it is widely used by health professionals lifestyle intervention situations. (Suomen Diabetesliitto ry 2010.) Quantity R_{diab} describes the risk of the test points and the unit was pcs.

5.3.7 Audit alcohol test

At our research we used a large-scale Audit-alcohol test to reliably identify the research participants' alcohol consumption habits. We used the audit test as a part of our education to show the participants the alcohol usage and how it affects their life and how they can affect the consumption of alcohol. (Lindroos, Rokka & Lehmusvaara 2007.) As a label for the audit test we used R_{audit} and the unit was pcs.

5.3.8 Fagerström two questions nicotine dependence test

Fagerström test two questions charted the research participants' smoking habits. The test was easy to show that ushered in with the person actually smoking rate and the level of nicotine dependence. (Saarelma 2014.) The test is scored simply and we used a label R_{fager} marking and the unit was pcs.

5.4 Meter

For our study, we used a measure of tabulation, to which was recorded each trial measurements. The actual measured values were the averages from the before and after results and if needed some values would be highlighted from individual participants. The meter parameters were separated blood pressure, resting heart rate, venous fasting blood glucose value, mass, body mass index, waist circumference, Diabetes risk test score, Audit test score and Fagerström test score. The actual material is tabulated at the annexes of this thesis.

Table 3. Measurement result form

Index	Quantity	Unit	First value	Second value
Systolic blood pressure	Psys	mmHg		
Diastolic blood pressure	Pdias	mmHg		
Mean arterial pressure	Pmap	mmHg		
Pulse	HR	bpm		
Fasting glucose	fP-Gluc	mmol/l		
Body mass	M	kg		
Height	H	m		
Body Mass Index	BMI	kg/m2		
Waist circumference	C	cm		
Diabetes risk factor points	Rdiab	pcs		
Audit point	Raudit	pcs		
Fagerström points	Rfager	pcs		

5.5 Data analysis

To ensure reliability and to minimize the measurement error in the table signs, for the physiological results, from both measurement times three results were recorded for the table. The written test results were recorded as a simple result of. Blood pressure trends, analysis of the systemic blood pressure readings were separated, so that the analysis would be simpler and allow mean arterial pressure calculation. The total pressure in the systemic circulation describes the computational medium pressure P_{map}, which is obtained by using the equation $P_{map} = P_{dias} + ⅓(P_{sys} - P_{dias})$ Circulatory medium pressure into circulation has been taken into consideration trial subjects cardiac output and peripheral vascular resistance, which are each individual. Non-invasive blood pressure measurement medium is only an indicative result. Determining the exact result would be necessary to measure the P_{map} invasive techniques. (Junttila 2012, 20.)

In our study sample, N = 5, was very small. Illustrating the sampling reliability by calculating the standard deviation, averages and medians mutual comparisons. From the analysis of the measurements can not be established no universal conclusion, only sampling can be observed in the research a number of internal changes.

At the initial stage, we found that the two questions Fagerström nicotine dependence test for each trial subject was zero, so this test score can be completely ignored. In the analysis phase, we performed a linear examination by looking at the whole group instead of the individual. We calculated first averages for each variable. Then calculated the medians, minimums, maximums, quarter quartiles and standard deviations for each of the measured value before and after the control. Finally, still averages were calculated for each measuring changes in the incident, which is shown below in the graph. With regarding variance we were satisfied with reporting the standard deviation.

According to Tannila (2014, 9), dependent samples t-test should be used if the sample is at least 30 and subjects measured before and after the operation. In the analysis, we didn't used a measure of the reliability of t-test, because of our study's small sample. In this case, Tannila's (2014, 9) conditions are not met. Our study measurements have been made with instruments that are generally used in health care, that are designed for medical use and calibrated equipment, so we can assume to be reliability of our results. In order to minimize measurement error we have made each measurement three times for each measurement.

6 The results of the study

For the results for the analysis and presentation, we have used mainly averages. In some individual cases, we have brought up some significant individual measurement results.

6.1 Backround variables

For our study there were several background variables that are unaffected by our actions. These are some factors that can affect the results of our study, but are unaffected by anything we can do to the subjects. These include age, prior knowledge, height, sex and possible family history of diseases. We can affect the age of the participants in some manner, by recruiting only from a general age group. This leads to difficulties if we wanted to eliminate the possible variability that can happen from age, as we cannot guarantee that all the participants are exactly the same age.

The prior knowledge of the participants cannot be affected by us, as every participant has been educating themselves on the topics that we are going through in our lifestyle education. We can still standardise the information that is to be given to the participants to reduce the impact of prior knowledge.

We cannot affect the height of any participants as this is decided by their individual genetics. The differences in height can lead to some variability as it affects the BMI -scores. Family history of diseases cannot be affected by us, as genetics play the major role on hereditary diseases. These differences can lead to higher scores in some of our tests.

Table 4. Backround variables

	Value	**Intake**	**Percentile**
Sex	Men	4	80 %
Age group	Under 30 years	5	100 %
Diseases in family	No	5	100 %
Instruction compliance	Yes	5	100 %

Some individual counselling was given to subjects that felt that they needed it, which could lead to small amount of variability. We also strived to minimise the

variables of our education by giving the subjects the same education and same guidance. Some of this guidance is that we sent the same instructions to every subject before the measurements and also asked if the subject has done as instructed before the measurement to be sure that we can minimise the possible variabilities. Measurement variabilities were minimised by using the same brand and same model of measuring instruments on both measurements.

6.2 Cardiovascular and circulatory system

From blood pressure, the systolic and diastolic blood pressure were separately measured, and for each subject mean arterial pressure was calculated. During the period, systolic blood pressure decreased by an average of 7,8 mmHg with the end average of 121,8 mmHg, change that occurred was approximately -6 %. Systolic blood pressure was observed in all subjects.

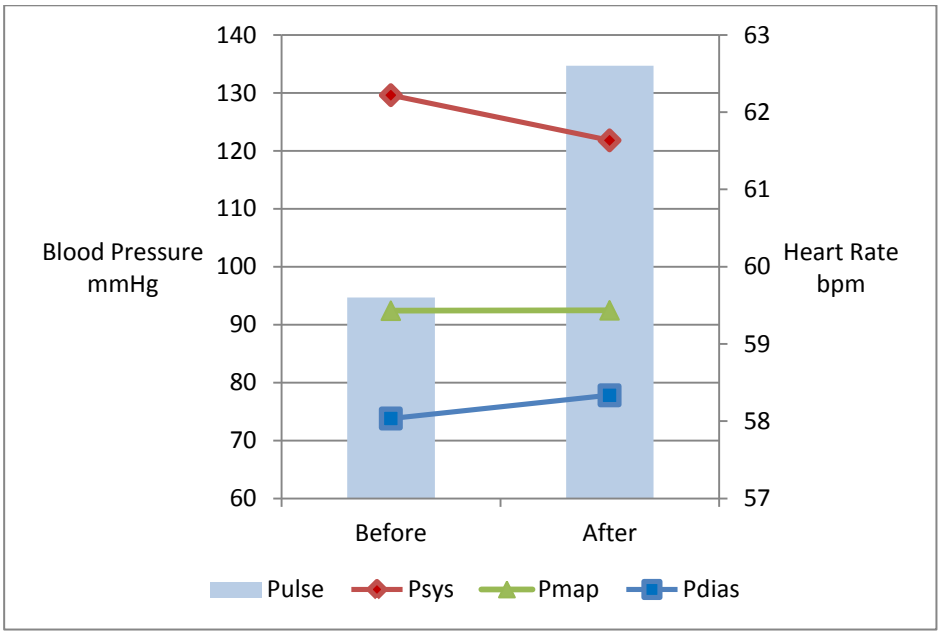

Figure 1. Blood pressure and pulse

During our control period, diastolic blood pressure rose by 4 mmHg. The final value for the diastolic blood pressure was 77,8 mmHg, approximately 5,4 % increase occurred. On the other hand the trial subjects mean arterial pressure

remained almost unchanged, decrease of only 0,1 mmHg, less than 0,1%. As observed in Figure 1, pulse frequency has increased by an average of 3 bpm value of 59,6 bpm value of 62,6 bpm, when the change was 5 %. Only one subjects had their resting heart rate decreased, as had been expected. (Figure 1 and Appendix Table 1.)

6.3 Endocrine system

Fasting blood glucose decreased from the starting value of 5,56 mmol/l to 5.12 mmol/l, this was expected result of a three-month period that the average fasting plasma glucose, the percentage fall in the group of subjects was -7,9%. In the group, two persons fasting blood glucose levels did not decrease, which is explained by the first measurement of fasting value of 4,7 mmol / l. (Figure 2.)

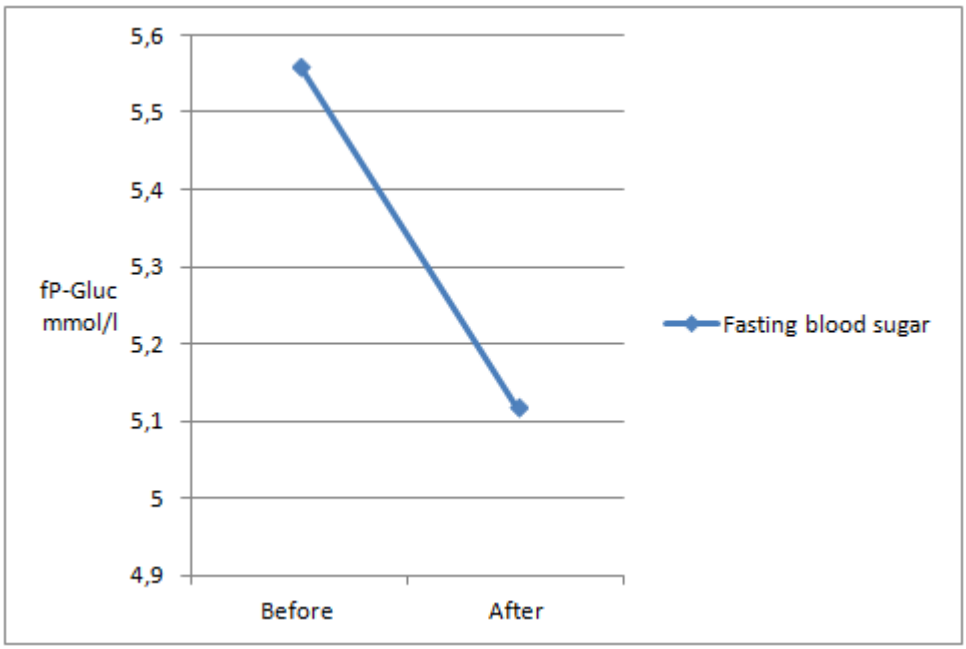

Figure 2. Fastin blood sugar

6.4 Body weight and waist circumference

The subjects' weight decreased by 1,38 kg, -1,4%, where the statistical error causing sizeable differences in the weights starting result. On the other hand the statistical illusion creates one subject mild weight gain, about 0,2 kg. Most individuals were able to lose weight up to 2,9 kg in three months. Weight loss was observed in three of the five surveyed persons. With the weight, body mass index was also calculated, which had also slightly decreased as the height of the subjects was held constant. Waist circumference decreased in subjects an average of 3,8 cm, which is a percentage of about -3,8 %. In the group, the biggest change was approximately 10 % and the change was observed in four of the five subjects. (Figure 4.)

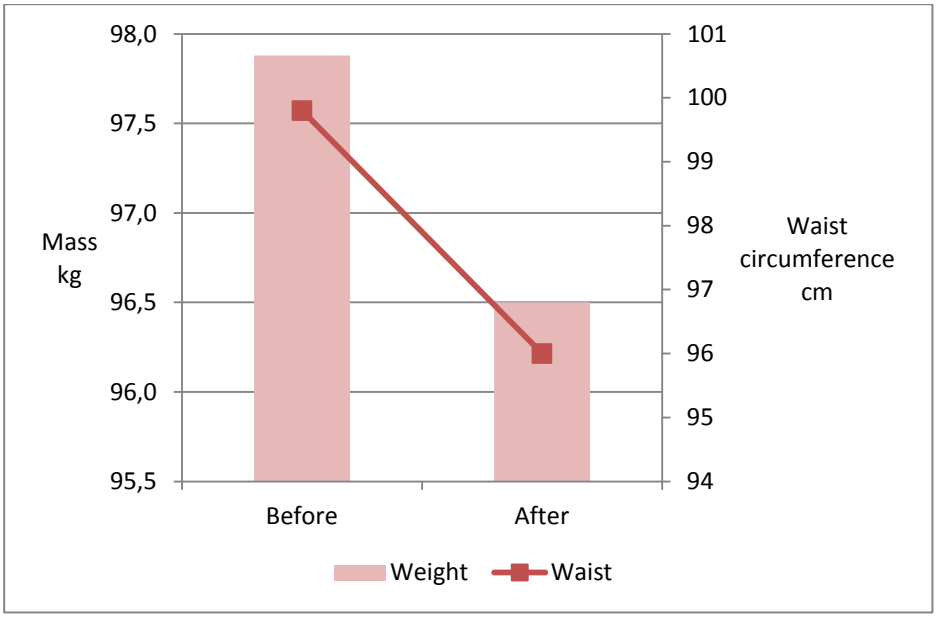

Figure 3. Weight and waist circumference

Body mass index was also a factor in diabetes risk test, and contributed significantly to the diabetes risk test results. Body Mass Index change was also 1,5%. (Figure 4.)

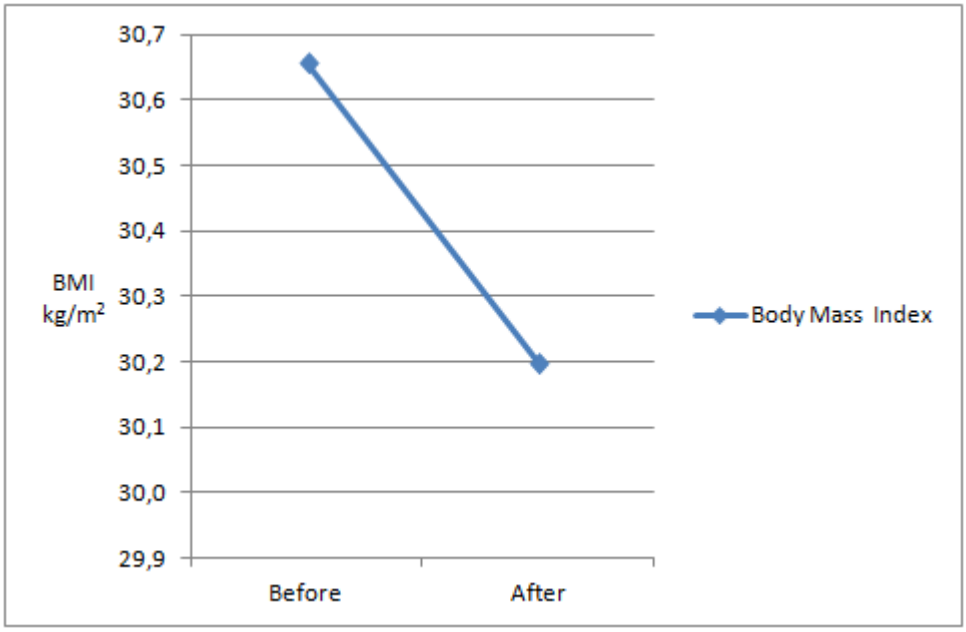

Figure 4. Body Mass Index

6.5 Diabetes risk test and Audit alcohol test

Diabetes risk test result change was -12,5%. Two thirds of the subjects lowered their diabetes risk test results, as compared to the situation before lifestyle guidance. For two of the five results did not change, although the physiological measurements were better. The fifth person the explanatory factor was previously at a result of zero and the result of the second test as defined by waist circumference point border score, which he crossed on less than one centimeter. Audit the use of alcohol habit test result was also as expected, loss of -12,5%. Alcohol consumption habits changed for the better in only one out of five, his change was relatively high; from 12 points to eight. For four out of five, the alcohol use habits were good already before the measurement conditions. (Figure 5)

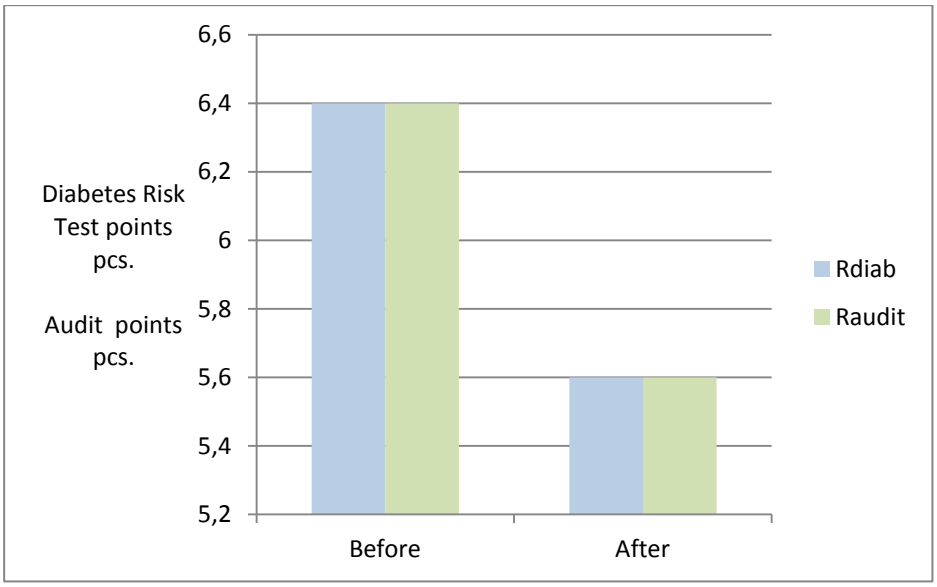

Figure 5. Diabetes risk test and Audit alcohol test points

7 Summary

After analyzing the results of the study, the results were encouraging and like we had expected. Despite its small sampling of subjects, based on measurements, participants have benefited from lifestyle counseling. Here we have dealt with the thesis research results in relation to previous studies, and literary sources.

7.1 Research reliability and validity

In quantitative research reliability refers to the consistency of the research results and validity tells about the how well the chosen meter studies the correct results. Improperly selected the meter will study the wrong answers than what were originally meant to be studied, which are also not of reliable from any point of view. (Hiltunen, 2009) In this study, we didn't analyze the reliability of the results, due to our small sample size.

The internal validity was assessed by performing the meter in terms of relevant measurements. The holistic risk of diabetes was estimated by Suomen Diabetesliitto ry (2010) test the risk of diabetes and alcohol use Audit-test on

an individual level. All the participants studied at University of Applied Sciences' School of health and social studies, so they were assumed to have prior education on the lifestyle guidance education. The external validity of the research was to control the people at the selection stage. We try to limit the study participants to be less than 30 years of age, who were viewed as diabetes risk patients and at least have a slight risk of diabetes. The risk group membership was defined by the Diabetes Risk Test, a score obtained by the numerical value was defined at one point, so that the overall change is possible. For a secondary selection criteria we had high blood pressure. In this study, it was not investigated how intensively the participants were carrying out the given lifestyle education.

7.1.1 Reliability

The reliability of the research is based on that the research gives out results that are not random. These results must be repeatable, which means that if another research group uses the same methods that have been used, they should acquire nearly the same results. (Hirsjärvi, Remes & Sajavaara 2007, 226.) The results of our thesis are mostly in line with the results of the Finnish Diabetes study and Käypä Hoito recommendations. This study is repeatable because the methods used are described accurately and in detail.

In quantitative study there are methods that can be used to bring out the reliability of the results, with using these methods statistical variances can be avoided and on what probability the results gained are not in line with our hypothesis. (Hirsjärvi, Remes & Sajavaara 2007, 226.) In our study we didn’t use the t-test, because we had small sampling, so the p-value of any measurement result would give the statement of non-reliability. In our thesis we have acknowledged the small size of our sample group. When we have been reviewing the results, we have observed that the averages are close to the examinee groups’ median results.

7.1.2 Validity

The indicator has to be passable to measure the research question, so that the indicator gives information about the subject that is being researched. The indicator must also be something that is used commonly in the scientific community. With a good indicator, the results of different studies can be compared. (Hirsjärvi, Remes & Sajavaara 2007, 226.) Our indicator for this study is a simple table, which is easily observed. Our indicator can also be used in studies that are similar to ours.

On how the indicator works is affected by any disturbances that happen in the measuring, it leads to the measurement defects that can be predicted, and so they can also be reduced. (Hirsjärvi, Remes & Sajavaara 2007, 227.) We have tried to minimise the possible errors in the measurements by giving proper instructions for the examinees before the actual measurement situation. We have also been inquired from the examinees if they have been following the lifestyle education that was given to them. Lifestyle on the controlling period affects directly on the later measurement results.

It would be good if there were more personnel in a study to divide the parts of the study, this would lessen the structural errors in a study. This is called researcher triangulation. (Hirsjärvi, Remes & Sajavaara 2007, 227.) In our study this has not been possible, because of the lack of personnel.

7.2 Examination of the results

Our study looked at the results in relation to previous studies, and literary sources. We divided the whole perception of the results to heart and the circulatory system, the endocrine system, the weight and the written the test methods on the results.

7.2.1 Cardiovascular and circulatory system

From the systolic blood pressure calculation it may be inferred that among the group, body volume decreased, when the heart does not have to pump blood to a nearly as wide amount of tissue, the systolic blood pressure decreases. (Kaukua 2009, 884.) On the other hand the arterial walls are not so much under stress, and so the cardiovascular risk can be expected to have decreased. (Mustonen 2000, 1104.) According to Luomanmäki (2000, 998) the increased exercise refers to exercise to provide a venous return intensification closing to normal values. A small heart rate increases may be due to the tension during measurement or other individual factors.

For the diastolic blood pressure, mean arterial pressure and pulse frequency change, we do not see that the lifestyle education had a significant impact, because, similar to those shown, small changes can also be explained by measurement error or other background variables, such as the previous day's diet. A major change can be observed in systolic blood pressure with regard to the calculation of which is more than 7 mmHg is proportional to the dropped weight, and fasting blood glucose value change was expected, as well as what the previous studies had verified as the result. (Mustajoki, 2014a.)

7.2.2 Endocrine system

The endocrine system, the effects were examined with regard to fasting plasma glucose, which is one of the most important tools in the diagnosis of diabetes. Healthy young people are at risk if the fasting plasma glucose threshold is 6 mmol/l or more. For fasting blood glucose decreasing, the reasons include the acceleration of metabolism, weight decreasing and visceral fat due to the narrow insulin resistence reaction decline. (Mustajoki 2014b.)

Lifestyle counseling addressed specifically nutrition, physical activity, and substance abuse, all of which all are connected to each other. Increased physical activity stimulates the metabolism and on the other hand, the fair use of drugs will not stop it. Balanced nutrition provides the body with the neces-

sary vitamins and micronutrients in the right proportion. From nutritional point of view, the consumption of energy in relation to the usage, does not drive the body to a catabolic state. In this case, insulin production is steady and blood sugar levels remain stable in respect to the load, which lowers blood fasting blood glucose concentration.

7.2.3 Body weight and visceral fat

Weight loss has been one of the key factors of this study. Weight loss affects every single value, which are illustrated in this study. For every subjects the weight loss was somewhat slow, which leads to traces of education situations contents. Under the guidance we focused on small lifestyle changes on a long term, rather than a major change in the short term would not have been realistic to expect. (Kaukua 2009, 884.)

To the weight measurement results increasing exercise can also lead to increased muscle mass that can give unreliable results in this regard and individual factors, factors such as the amount of fat tissue, which in this study was not measured. In this respect, the growth of muscle mass can be assumed to be, due to the short length of the control period, low. Waist tells the amount visceral fat, around the internal organs, the amount of fat that is superficial fat tissue significantly more harmful exposure of the metabolic syndrome and diabetes. (Kaukua 2009, 884.) In our study, it is clearly spelled out that dieting even small amounts kilograms it was possible contribute to the decrease of visceral fat.

7.2.4 Diabetes risk test

Lifestyle change, such as vegetables, eating and increased physical activity in daily activities can have a significant impact in the score on risk test. Secondly, the decrease of the score is also affected by the above-reported body mass index score and waist circumference. With one exception, each of the control group individuals got to the low-risk category during our control period. (Suomen Diabetesliitto ry 2004) The risk test had some factors that could not

be affected by the lifestyle counselling. Examples of this kind can be counted, for example, family burden or previously diagnosed hypertension or blood pressure medications.

Audit test score influence was considerably unambiguous, since it is not affected by the trial subject's physiological factors, but only alcohol consumption is a changing factor. Participants in the study were already drinking alcohol in moderation or slightly more than the risk limits. The effects of alcohol, especially visceral fat formation due to its energy riches and strain it puts on the liver are indisputable, which is why making the Audit test felt was justified. (Suomen Diabetesliitto ry 2014.)

7.3 Ethics of the thesis

In every research publishment the ethicality of the research falls upon the research personnel. This spans to all the decisions that are made during the research. This also demands critical thinking and precision. As a topic researching obesity and diabetes, this can present numerous of ethical problems, such as feelings of embarrassment for example. It is also required for good ethics that the research participants are aware of the research and have given consent for their participation on the research. (Hirsjärvi, Remes & Sajavaara 2007, 23-27.)

In the study it is needed to use accepted methods of the scientific community, which are honesty, diligence and accuracy, as well as administrative practices. The background knowledge used in any research must be from reliable sources. (Hirsjärvi, Remes & Sajavaara 2007, 24.) We have been measuring, reporting and making statistics as accurately as possible. We have also applied for official permit for our research and also received it before starting our research. The knowledge base used in our research has been collected from reliable and ethically approved sources. Every material we have used as a source in our thesis, has been properly marked and credited.

At the start of our research we wanted to get the participants from a very specific target group, that can sometimes have some insecurity problems, and so we wanted to properly inform the possible participants of our research topic and its goals. On a general basis it is considered that it is good ethics that the research is based on voluntary participation. It can also affect the reliability of the research. (Hirsjärvi, Remes & Sajavaara 2007, 23-27.) This was done so that the participants could make informed consent about participating or not. The participation was completely voluntary and this was made clear to the participants, that if they wanted to resign from the research, they could do this at any time.

The examinees have to give their informed consent to be participated in any study, and they have to be able to express their own will to be participants. As basic principle for any study has to be respect of human dignity. They are informed what kind of information is gathered from them for the study and how the information is used. Anonymity is also considered to be one of the cornerstones of good research ethics. (Hirsjärvi, Remes & Sajavaara 2007, 25.)

Ensuring anonymity is part of respecting the human dignity of a participant. (Hirsjärvi, Remes & Sajavaara 2007, 25.) We also wanted to ensure the anonymity of the participants by not collecting any personal information that could be used to identify them, such as full names, social security -number, student numbers, etc. So we assigned every participant a number so that we could identify possible statistical variations.

When the group was formed we have strived to avoid embarrassment and respect their human dignity as much as possible. Individual support and counselling was offered to the participants if they felt that it was needed. We tried our best to ensure that the participants can feel as comfortable as possible, by reducing any embarrassing situations to the minimum and giving the participants possibilities wherever we could, for example having our participants come to the measuring situation individually so that only ones who know the results are the two researchers and the participant.

7.4 Conclusions and research continuity

This study's research question was to find out how lifestyle counseling appears as a phenomenon in trial subjects physical state from the quantitative point of view. The results were in accordance with the hypothesis, and were also supported by the previous, extensive national and international studies. The study led to the conclusion that, in the limited context of lifestyle counseling, it was a clear benefit for diabetes risk perspective. (Figure 5) Lifestyle guidance's greatest benefits appeared to be the decrease of systolic blood pressure and fasting blood glucose, as well as the decrease of the weight and the waist circumference reduction. (Figure 1.)

According to this study, as a group implementations offered lifestyle advice appears to be efficient in this limited context, in relation to the physiological measurements. The significance of lifestyle education, for our participants, has been the factor that has put lifestyle changes in motion, with which the participants have lowered their diabetes risk. In the lifestyle education we took into account the individual aspects by instructing them to pick the most useful information and changes from which they will benefit from, that they will then implement. In this way the individual is being taken into consideration during the counselling and it still has the patient oriented approach.

Lifestyle education and promotional health counselling are important parts of public health work, which can be used to prevent several chronic illnesses. From an economic point of view, preventive care work can also reduce healthcare costs considerably and thus improve the working capacity of the people in risk group and decrease the risk of developing chronic public health disease. (Health and Welfare 2014)

We believe that in the future it would be important to examine how individual perspectives can be integrated into a comprehensive, group carried out, lifestyle counseling, or other similar intervention activities, as the operational efficiency and the unique perspective into account, more micro-level Individual commitment to long-term lifestyle change and healthier lifestyles maintenance.

(Turku 2007, 24) However, further research topic selection category can also be a similar way of life control reproduction of a wider study material of less than 30 years of age among people, as well as a planned implementation of a customer-oriented guidebook for health promotion work environment.

7.5 Self evaluation

Our thesis can be used by JAMK university of applied sciences in several areas. It could be used with student health care to help students that are in risk of developing diabetes, and if they are motivated to do lifestyle changes, use this thesis as a base for lifestyle education to help with the preventive work. This could be done several times a year, as a part of student health care. This thesis could also be used in collaboration with JAMKO to design possible education courses for students, about the topics discussed in this thesis. JAMKO could also use this as a background for some exercise club activity for the students.

These methods we have used in this study have some limitations, that should be addressed if a larger scale work would be done. In our study we gave the participants an option to contact us, if they thought that they were in need of support, this can lead to some variabilities in the final results, as some participants can have more education and support when compared to others. Most of our participants also were motivated to participate in this study, and thus they were much easier to motivate to make changes in their lifestyle, this could make the final results much different in a larger scale study.

In our study the main weakness points were the more administrative aspects of our study. We had a very hard time to bring our group together for one single lecture, as we had only short time to make reservations to get a classroom from JAMK. And for this reason we had to take the measurements and give the information in several groups, which is not ideal in our opinion. Also we had lots of difficulties to get enough participants for our study, as this topic is widely regarded as a topic that makes people ashamed. The counselling ma-

terial was a bit confusing and didn’t always follow logical path to ensure the best learning experience for our participants.

In our study the parts we succeeded the most were, information gathering and critical analysis of this information, as information about this phenomenon can be found quite easily. It was easy for us to root our thesis to previously researched information. We were also able to find some material about interventions that gave us very reliable base for our own intervention situation. The fact that our raw data can be called very reliable, as we were able to address most of the problems that could have made the measurements unreliable. We can call our thesis a success as the data we gathered was very close to what our hypothesis was, and this information can be easily used in everyday life as education material.

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Appendix

Appendix 1. Thesis data sheet

This appendix table include raw measurement data and its analysis.

First mesurement		**Examinees ID number**				
Quantity	**Unit**	1	2	3	4	5
P_{sys}	mmHg	128	139	141	115	125
P_{dias}	mmHg	71	79	79	73	67
P_{map}	mmHg	90,0	99,0	99,7	87,0	86,3
HR	bpm	57	50	64	59	68
fP-Gluc	mmol/l	5,1	5,9	4,8	7,3	4,7
M	kg	78,3	107,2	107,2	126,5	70,2
H	m	1,80	1,76	1,90	1,80	1,65
BMI	kg/m2	24,2	34,6	29,7	39,0	25,8
C	cm	81	109	95	134	80
R_{diab}	pcs	0	10	8	13	1
R_{audit}	pcs	6	12	8	1	5
R_{fager}	pcs	0	0	0	0	0

Second mesurement		**Examinees ID number**				
Quantity	**Unit**	1	2	3	4	5
P_{sys}	mmHg	123	124	129	114	119
P_{dias}	mmHg	71	80	81	76	81
P_{map}	mmHg	88,3	94,7	97,0	88,7	93,7
HR	bpm	67	53	61	62	70
fP-Gluc	mmol/l	5,1	4,8	4,6	6,4	4,7
M	kg	78,0	105,2	107,4	124,0	67,9
H	m	1,80	1,76	1,9	1,8	1,65
BMI	kg/m2	24,1	34,0	29,8	38,3	24,9
C	cm	80	105	94	121	80
R_{diab}	pcs	0	7	7	13	1
R_{audit}	pcs	6	8	8	1	5
R_{fager}	pcs	0	0	0	0	0

First mesurement

Quantity	**Unit**	Minimum	Minimum 25%	Median	Maxium 75%	Maximum
P_{sys}	mmHg	115	125	128	139	141
P_{dias}	mmHg	67	71	73	79	79
P_{map}	mmHg	86,3	87	90	99	99,7
HR	bpm	50	57	59	64	68
fP-Gluc	mmol/l	4,7	4,8	5,1	5,9	7,3
M	kg	70,2	78,3	107,2	107,2	126,5
H	m	1,65	1,76	1,80	1,80	1,90
BMI	kg/m2	24,2	25,8	29,7	34,6	39,0
C	cm	80	81	95	109	134
R_{diab}	pcs	0	1	8	10	13
R_{audit}	pcs	1	5	6	8	12
R_{fager}	pcs	0	0	0	0	0

Second mesurement

Quantity	**Unit**	Minimum	Minimum 25%	Median	Maxium 75%	Maximum
P_{sys}	mmHg	114	119	123	124	129
P_{dias}	mmHg	71	76	80	81	81
P_{map}	mmHg	88,3	88,7	93,7	94,7	97
HR	bpm	53	61	62	67	70
fP-Gluc	mmol/l	4,6	4,7	4,8	5,1	6,4
M	kg	67,9	78	105,2	107,4	124
H	m	1,65	1,76	1,80	1,80	1,90
BMI	kg/m2	24,1	24,9	29,8	34,0	38,3
C	cm	80	80	94	105	121
R_{diab}	pcs	0	1	7	7	13
R_{audit}	pcs	1	5	6	8	8
R_{fager}	pcs	0	0	0	0	0

First mesurement

Quantity	**Unit**	Standart deviation	Standart deviation (N)
P_{sys}	mmHg	9,5	10,7
P_{dias}	mmHg	4,7	5,2
P_{map}	mmHg	5,8	6,5
HR	bpm	6,2	6,9
fP-Gluc	mmol/l	1,0	1,1
M	kg	20,7	23,1
H	m	0,1	0,1
BMI	kg/m2	5,5	6,2
C	cm	20,1	22,5
R_{diab}	pcs	5,1	5,7
R_{audit}	pcs	3,6	4,0
R_{fager}	pcs	0	0

Second mesurement

Quantity	**Unit**	Standart deviation	Standart deviation (N)
P_{sys}	mmHg	5,04	5,63
P_{dias}	mmHg	3,87	4,32
P_{map}	mmHg	3,42	3,82
HR	bpm	5,82	6,50
fP-Gluc	mmol/l	0,66	0,74
M	kg	20,55	22,97
H	m	0,08	0,09
BMI	kg/m2	5,38	6,01
C	cm	15,63	17,48
R_{diab}	pcs	4,72	5,27
R_{audit}	pcs	2,58	2,88
R_{fager}	pcs	0	0

First mesurement

Quantity	**Unit**	Group averages 1.	Average changes (2-1)
P_{sys}	mmHg	129,6	-7,8
P_{dias}	mmHg	73,8	4
P_{map}	mmHg	92,4	0,07
HR	bpm	59,6	3
fP-Gluc	mmol/l	5,56	-0,44
M	kg	97,9	-1,38
H	m	1,78	0
BMI	kg/m2	30,7	-0,5
C	cm	99,8	-3,8
R_{diab}	pcs	6,4	-0,8
R_{audit}	pcs	6,4	-0,8
R_{fager}	pcs	0	0

Second mesurement

Quantity	**Unit**	Group averages 2.	Percentile
P_{sys}	mmHg	121,8	-6,0
P_{dias}	mmHg	77,8	*5,4*
P_{map}	mmHg	92,5	0,1
HR	bpm	62,6	*5,0*
fP-Gluc	mmol/l	5,12	-7,9
M	kg	96,5	*-1,4*
H	m	1,78	0,0
BMI	kg/m2	30,2	*-1,5*
C	cm	96,0	-3,8
R_{diab}	pcs	5,6	*-12,5*
R_{audit}	pcs	5,6	-12,5
R_{fager}	pcs	0	